



## CAN AMERICA DO IT?

By G. WALTING

*Having suffered one military defeat after another since the outbreak of the second World War, and being none too confident in the remaining strength of the USSR, the Allies are forced to talk more and more about the distant future, in which, they hope, the American armaments will come into play. What chance have the grandiose plans of the United States of materializing?*

*No one will underestimate the capacity of American industry. The wealth of raw materials in the USA is known. But to what degree is American industry, grown up in an atmosphere of plenty, prepared to fulfill the demands of the politicians of its country for arms and more arms, for production and more production, not only for America, but also for her weakened allies? What is the mental attitude of industry, and can it cover its requirements in raw material, machinery, and labor? The interest of the whole world is focused on these questions and their influence upon the initial speeding up of the American armament industry. They are dealt with in the following article.*

*The author left America shortly before the outbreak of the Pacific War. He spent many years in the United States working with an industrial concern whose name is a household word throughout the world.—K.M.*

**T**HE strong point of American industry is its mass production. Through this method of manufacture, which is not suitable for every product, it has during the last twenty years promoted one particular group of articles which may be combined under the heading of "aids to personal comfort." Starting with automobiles, building materials, heating and plumbing installations, washing machines, refrigerators, radios, electric stoves, radiators, and household appliances, this list also includes the products of the canning and packing industries. A huge demand for all these articles has been created in the

United States, and, as the manufacture of them ensured good profits, the whole trend of industrial development was influenced accordingly. Even the purely technical branches of industry, such as the manufacture of machinery and apparatuses, as well as steel, steel plates, plastics, and enamel production, had to adjust themselves to the demands of the mass-production industries.

### BUTTER INSTEAD OF GUNS

The share of automobiles and household goods in the total production was rising constantly. The sales figures

published for 1940 of 4.4 million motorcars, 2.6 million household refrigerators, 1.6 million washing machines, 11 million radios, indicate clearly to how great a degree the factories and workshops of American industry were busy with the manufacture of these goods. Turnovers of such size not only occupy the existing productive machinery and technical equipment of an industry, but also mean the tying-up of such raw materials as steel, copper, aluminum, brass, cadmium, chromium, and others.

This trend of American industry can easily be understood in a rich country and in times of peace. But it is noteworthy that it was not disturbed by the outbreak of the second World War nor by the Lend-Lease policy of Roosevelt in 1940, indeed, not even in 1941. As late as July 1941, General Motors announced that its sales organization had in the nine preceding months sold more automobiles than ever before in the history of the concern. Early in 1941 the refrigerator industry reported further increases in the number of orders, which was 70 per cent higher than the figure for 1940. Similar successes in sales were reported in other industries. This phenomenon was all the more surprising as the "Office of Production Management," the highest authority for supervising national rearmament, admitted at the very same time that armament deliveries were in arrears.

#### POST-WAR WORRIES

The contradictory nature of these reports enables one to draw conclusions as to the fundamental attitude of American industry. This is, moreover, confirmed by a pronouncement of William S. Knudsen, the chairman of the Office of Production Management, who, when asked whether American industry were able to carry out the rearmament program of the Government, answered in the affirmative, with the reservation that industry would—as had hitherto not been the case—really use to the full its resources for rearmament.

The utterances made during this period by representatives of industry only serve to confirm that the changes which Mr. Knudsen hints at had not yet taken place. At that time the industrialist was occupied with the problem of what would happen to industry and its employment after the war. How would the switch-over from war-time to peace-time industry be made at the end of the war? This was the question being discussed everywhere in industrial circles and which was chosen as the subject for the main report of the 1940 winter meeting of the Institute of Electrical Engineers. In the autumn of 1941 the press reported the planning of building activities in 52 cities as a measure of practical unemployment relief, to be started when the war was ended.

#### SKEPTICAL CAPITAL

Capital saw no good prospects of profit in the situation obtaining. Doubts were expressed on all sides regarding the advisability of increasing industrial capacity by enlarging the existing plants. If one bears in mind that the problem of the overcapacity of industry had for years been the subject of discussion in industrial circles and with the general public, and that the lack of balance between production and consumption was constantly given as the main reason for unemployment and the continual feeling of crisis in the American market, one can understand that the factory owners showed little sympathy for the Government's desire for enlarged capacity. There was no inclination to invest, so the initiative was left to the State. The same restraint was expressed in the unaccommodating terms of payment demanded by exporters from their customers, from which it was mainly the South American countries who had to suffer.

The Stock Exchange confirmed this situation with increasingly low levels in share and bond quotations. The downward tendency of the New

York Stock Exchange, which had not stopped since the beginning of the European conflict, ran parallel to the skepticism of financial circles and the uncertainty of industry. When in August 1941, after days of surmise and expectation, the news of the famous meeting between Churchill and Roosevelt on the Atlantic was released for publication, the New York Stock Exchange—a barometer famed for its accuracy in reflecting the mood of the business world—reacted with a minimum turnover. And the specter of the constantly rising national debt continued to overshadow everything.

### RAW MATERIALS NO OBJECT

In presenting this situation we have outlined the mental attitude of American capitalism. But even presuming that the pressure of present times and the growing concentration of power in Washington will succeed in overcoming the existing egoism and the passive resistance of the capitalists, there still remain obstacles of a technical nature. How is the raw material situation? To what extent does the machinery exist for such gigantic armament orders as have been announced by Washington? How much human labor is there available to carry out these plans and to run the machines? How is the industry of the United States, running at such high speed for peacetime requirements, to be stopped and set in motion again for war requirements?

Let us first consider the question of raw materials. Every industrial product is made up of raw material and labor. Hence the efforts of engineers are directed toward designs that can be manufactured with a minimum of material and a minimum of labor. Every improvement of a product attempts to decrease either the consumption of material or the share of labor. American and German engineering have approached this goal by different roads. American products represent an expenditure of material

unlimited in both quantity and quality, with a minimum of labor. German products are marked by a minimum of raw material, while the expenditure in labor is generally higher than in America. In other words: American industry places unlimited raw materials at the disposal of its engineers, if through the use of them the engineers succeed in reducing the working hours involved; German engineering, on the other hand, saves raw materials even at the cost of more labor.

### REDUCE THE LABOR!

The development of such a trend originates in the raw-material and labor situation of a country. In the United States it was given its impetus by the existence of great wealth in raw materials. Such a trend, however, in the long run influences the entire technical thought and structure of industry. The American development is expressed in the greater share of material in almost all American products, in comparison with the same products of German origin. The most popular American car weighs 1.3 tons, compared with 0.85 tons for the most popular German car. The best-selling refrigerator in the United States weighs 300 pounds, as against the 165 pounds of the largest-selling model in Germany. Transformers of German construction are up to 40 per cent lighter than American models, even 50 per cent lighter as regards their oil content. Similar differences in weight can be found in other manufacturing groups.

Hence, in making comparisons, the figures for raw-material capacities should be adjusted in accordance with the fact that American industry manufactures a smaller number of turbines, generators, pumps, steel constructions, etc., from a given quantity of raw material, as obviously the material-wasting constructions of American industry cannot be redesigned overnight to save material. American and German engineers have been educated to different ways of working by the trend in the



development of their industries. The German designer spends three quarters of his time thinking about how to save raw material, while the American designer spends three quarters of his time attempting to reduce the share of labor in his construction.

### AN EXAMPLE OF SPECIALIZATION

America boasts of a steel capacity of 81 million tons. This is a very impressive figure, especially in times of rearmament. However, these 81 million tons contain an especially large share of the products mentioned before as "aids to personal comfort," since they consume large quantities of steel plates and sheets. This is a typical example of how a manufacturing group has developed its own raw material and special machinery, namely, special rolled steel and continuous strip mills.

The purchasing price of such a strip mill is between 10 and 20 million dollars. It represents, therefore, the expenditure for a battleship. With all their special gadgets for the difficult manufacture of flawless, thin plates, these plants are among the most complicated and expensive technical constructions of modern heavy industry. The Americans have developed this branch of industry to an astonishing perfection, and they possess far more continuous strip mills than Europe in proportion to the steel capacities of these two continents.

Nothing would be more obvious than to make use of these valuable machines for the newly arisen tasks of rearmament. But here it becomes apparent to what degree the advanced specialization and mass production have influenced the construction of machines and apparatuses. The investigations made by the Government showed that the use of these strip mills for the manufacture of urgently needed ship plates and armor plates would only be possible after considerable changes in construction, which would require not only time but also special workmen

and large quantities of iron. Of course, the block rolling-mills can still be used for the new purpose; but the adjoining large strip mills cannot, in view of their advanced specialization. It is only by realizing these difficulties in change-over that one can understand the heated discussions that took place last summer about the question of increasing the already gigantic steel capacity of the United States which had formerly never been fully utilized in peace time.

### FOR AND AGAINST EXPANSION

Equally competent experts and representatives of the Government spoke for and against the expansion of the steel industry. Those in favor of expansion were of the opinion that the redesigning of the existing plants would be so difficult and require so much time that it would be better to erect entirely new plants, even if there were no prospect of their being used later on. The opponents of expansion backed their argument with the claim that the construction of new plants would, for the time being, mean no increase in production. On the contrary, the demands upon labor and raw materials during the period of new construction, estimated at two years, would mean additional consumption. These two years, however, might be the decisive ones. To increase the steel capacity by 10 million tons, it was calculated, the construction of the necessary new plants would consume 4.1 million tons of steel.

The question of increased capacity has also a financial side. Considering the high cost of the machinery needed for steel production, the financing of an additional production of 10 million tons represents a vast undertaking. The amount of capital required for this expansion was estimated at 1 to 1.5 billion dollars. In this connection the financiers of the steel works recalled former false speculations. The last expansion, which had been completed in the economic crisis of 1932, had led

to only 19.5 per cent of the capacity of the American steel works being used in the same year. Even in the following years, from 1933 to 1938, the steel industry was never employed at more than 50 per cent of capacity.

### *ALLIES MUST SUFFER*

The continuous strip mill is an example of the development of American machinery as a result of the preference for the manufactures of mass production. It shows how, through large sales figures, special plants came into being which in their method of production are bound rigidly to the final product. The development of American machine tools toward single-purpose machines represents a trend which dominates the entire sphere of machine manufacturing. Multispindle drills, special welding machines, turret lathes, and shapers are to be found in many industries. An American author recently gave as the reason for the difference between German and American machine-tool construction that the German designers had, even ten years ago, always borne the manufacture of armaments in mind. Things are not as simple as this author makes them out to be; however, the difference—which in reality originates in the different trend of developments in the engineering of both countries—does exist in so far as it applies to the disadvantages of the one-purpose construction for the present situation.

The one-sided employment of American machinery through the manufacturing methods of mass production is an important factor in the getting under way of the American armament industry. It is no wonder that the American machine-tool factories are flooded with orders far beyond their capacity. The overemployment of the machine-tool industry is an indication of the extent of adjustment in all factories. How great a shortage there was is shown by the embargo placed by the American Government last year on the export of machine tools to Russia. Today it is no secret that those machine tools were placed in American plants during the

first attempts at expansion. The demand for machine tools was so great that no other way out could be found than to confiscate the orders of a future ally in order to get the American factories going.

### *AUTOMATIC CONTROL...*

At that time, however, it was only a matter of starting the program of naval construction approved by Congress, that is, the construction of warships, naval planes, docks, hangars, etc., with the necessary workshops. The United States certainly possesses an important machine-tool industry; yet she had to seize the Russian orders for the extension of her Navy. How much greater must be the shortage in machine tools now that the program has been enlarged to include a huge air fleet, motorized divisions with 40,000 tanks, a complete new merchant marine, the machine shops and shipyards necessary for this, and other urgent war requirements.

The American method of production and the products it preferred have also exerted an influence on American labor, its schooling and numbers. The tendency of American engineering to reduce the share of labor has led not only to the development of single-purpose machines but also to the preference for automatic control. The ensuing simplification in running the machines made it possible to employ unskilled workers and women. Together with this the demand for skilled labor decreased.

### *...AND THE LACK OF SKILLED LABOR*

In American industry there are no special arrangements for schooling skilled labor like the German apprentice system. The usual practice is to let a man learn his particular job in the plant. The same is true for engineers; they too must undergo a lengthy training within the plants before they are properly employed. During the depression years, that is, up to 1940,

however, the expenditure for training the younger generation had been greatly curtailed in all branches of industry, and new employment had been reduced to a minimum. The result is that now, at a time of greatest demand, the supply of skilled labor is more limited than ever.

This situation can partly be blamed on the attitude of the American factory owner, who was willing to pay a high premium for automatic control in his machines, not only to reduce labor hours, but also in order to become independent of skilled labor. And it is this anti-social attitude of the factory owner which is the basis for the engineer's important decision as to the apportioning of the human and the mechanical elements in his technical constructions.

### *MEN AGAINST MACHINES*

The extraordinary successes of the Japanese against the Americans and British have placed the importance of fighting spirit and human courage as opposed to weapons and armament in the limelight of discussion. No better example than the Battle of Hawaii and the sinking of the British battleships off Malaya could be given to show that the right or wrong distribution of duties between men and machines may mean the difference between victory and defeat. There are parallels to this example in the field of industry.

One can either make a rolling mill completely automatic, leaving the running of it to unskilled workmen who only have to press a button at the control table now and again, or one can place more simple machines in the

hands of skilled workers whose experience replaces the work done by automatic instruments. The product of the automatic machine is not necessarily always superior to the product from the hands of the worker. This can only be decided in each individual case. But it is certain that the exaggerated use of automatic control reduced mechanical skill and decreased the number of skilled workers in the United States.

### *LIMITS OF SPECIALIZATION*

Summing up we can say that specialization as developed in American industry has, through its one-sided preference for one group of products, led to a condition of inflexibility. This inflexibility applies to the training of labor, the existing machinery, and even the production of raw materials. To this must be added the handicap that American constructions and the entire American industry are wasteful in the use of materials.

Today we read about a quota system in the distribution of raw materials in the USA. Aluminum and chromium-plated steel are being replaced by plastics or porcelain. The manufacture of automobiles is being stopped. In the land of plenty, gasoline and rubber are being rationed.

So, in the end, the United States herself, in a remarkably rapid change-over, has supplied the most convincing proof for the claim that an engineering system designed to save raw materials shows the way into the future. For the American people, however, the late awakening to these facts represents a great hindrance on the dangerous path of war which they are treading today.

